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(54) Abstract Title  
Ceramide containing detergent

(57) A laundry detergent composition for washing delicate fabrics comprising surfactants; a natural and/or synthetic ceramide; a silicone emulsion and, optionally, other detergent ingredients.

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GB 2 330 148

DETERGENT COMPOSITION

This invention relates to a laundry detergent composition which is suitable for laundering fine fabric materials such as wool, silk, nylon, 5 polyester and the like under relatively mild washing conditions.

Laundry detergent compositions generally employ anionic surfactants as the primary detergent-active compounds, such as alkyl benzene 10 sulphonates, fatty alcohol sulphates or alkyl glycol ether sulphates. However, it has been found that a number of anionic surfactants damage the fibre structure of sensitive fabrics upon repeated washing. Fine fabric wash formulations 15 tend to contain a blend of anionic surfactants with non-ionic or amphoteric surfactants. The non-ionic surfactants are intended to increase detergency. However, when sensitive woollen fabrics are washed with non-ionics, the fabrics tend to feel comparatively hard and brittle. 20 These effects can be intensified with machine washing. An addition of softening amphoteric surfactants does not completely counteract the loss of feel and, although amphoteric surfactants act as fibre-softening agents, some anionic and 25 non-ionic surfactants reduce the softening effect of the amphoteric surfactants. Also, most known softening agents which are incorporated into detergents are detrimental to cleaning performance.

There is therefore a need for a fine fibre wash formulation which can be used to wash delicate fabrics such as woven or knitted woollen fabrics and silk, which gives a good cleaning performance without having a detrimental effect on the 5 properties of the fabric, and which ensures that the treated fabric has a soft feel.

In accordance with the present invention, there is provided a laundry detergent composition for 10 washing delicate fabrics comprising:

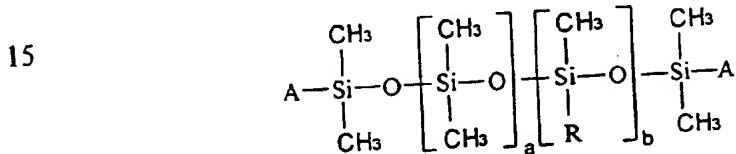
- a) one or more anionic, non-ionic or amphoteric surfactants or a mixture of two or more thereof;
- b) a natural and/or synthetic ceramide;
- c) a silicone; and
- 15 d) optionally other detergent ingredients.

Preferably, the detergent composition comprises:

- 20 a) 2 to 60 wt % of one or more anionic, non-ionic or amphoteric surfactants or a mixture thereof;
- b) from 0.001 to 5 wt % of one or more ceramides;
- 25 c) from 0.05 to 5 wt % of a polydimethylsiloxane; and
- d) optionally other detergent ingredients to 30 100 wt %.

5 It has been found that the use in the present composition of a silicone and a ceramide in combination provides a detergent with, simultaneously, a softening effect and an overall efficient cleaning performance.

10 Preferably, the silicone is a silicone fluid, more preferably a silicone emulsion, and most preferably a silicone micro-emulsion. Examples of suitable silicones are polyalkyl or polyaryl silicones. Particularly preferred silicones are polydimethylsiloxanes, with organic groups incorporated into the basic silicone backbone, having the following structure:



20 wherein R is an amino, polyether, epoxy, hydroxyl, polyether/amino, polyether/epoxy or cyclohexyl functional group; A may be any group suitable for ending the silicone chains, for example a hydrogen, methyl or hydroxyl group; and a and b are integers, preferably between 7 and 5000.

25 Examples of suitable silicones are those marketed under the trade names DC 225 (produced

by Dow Corning Corporation) and Magnasoft EM 410 (produced by Witco).

5 The concentration of silicone in the compositions of the invention suitably lies in the range from 0.05 to 5 wt %, preferably 0.1 to 2 wt % and most preferably the silicone concentration is about 0.5 wt %.

10 The ceramide present in the composition of the present invention may be a natural ceramide or a synthetic ceramide, for example an N-acylsphingenine or a derivative thereof. The amide-linked fatty acids are generally characterised by a C<sub>16</sub> to C<sub>26</sub>, C<sub>30</sub>/w-OH or C<sub>32</sub>/w-OH chain. The long chain amine may be sphingosine 15 or sphinganine or phytosphingosine.

Particularly preferred ceramides are Bis (N-hydroxyethyl cetyl) Malanamide which is marketed under the trade name Questamide H and 20 produced by Quest (this is synthetic "ceramide 2", with ceramide 2 being naturally found in hair); Palmitado-serinate de myristyl which is marketed under the trade name ceramide A2 and produced by Sederma; Palmitadohexadecanediol which is marketed under the trade name Ceramide 25 II and produced by Quest and a glycosphingolipid marketed under the trade name ceramide PG5 and produced by Sepraga.

30 The composition of the present invention may contain only one ceramide, or, alternatively, two or more different ceramides may be present.

10        The concentration of ceramide in the compositions of the invention suitably lies in the range from 0.001 to 5 wt %, preferably 0.001 to 2 wt % and most preferably 0.01 to 1 wt %.

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15        The desired effects of the present invention are attained by the combined actions of the silicone emulsion and the ceramide in such a detergent formulation.

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15        The composition of the present invention further includes detergent-active compounds. Many suitable detergent-active compounds are available and are fully described in the literature. The total amount of surfactant present in the composition of the present invention ranges from 2 to 60 wt % by weight of the total fine fabric detergent composition, preferably 5 to 40 wt %, and most preferably 10 to 20 wt %.

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25        The choice of anionic surfactant is not limited and any anionic surfactant suitable for use in a laundry composition may be used. Examples of suitable anionic surfactants are alkylbenzene sulphonates, particularly linear alkylbenzene sulphonates having an alkyl chain length of C<sub>8</sub> - C<sub>15</sub>; primary and secondary alkyl sulphates, particularly C<sub>8</sub> - C<sub>15</sub> primary alkyl sulphates; alkyl ether sulphates; olefin sulphonates; alkyl xylene sulphonates; dialkyl sulphosuccinates and fatty acid ester

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sulphonates. Sodium salts are generally preferred.

Particularly preferred anionic surfactants are sodium lauryl ether sulphate, which is available 5 under the trade name EMPICOL ESC3 from Albright & Wilson; sodium lauryl sulphate, which is available under the trade name EMPICOL LX from Albright & Wilson;  $\alpha$ -olefine sulphonate, which is available under the trade name RHODACAL A 246 L 10 from Rhône-Poulenc and disodium lauryl sulphonsuccinate, which is available under the trade name REWOPOL 5B F12 from Witco.

The anionic surfactants are desirably present 15 in amounts of 2 to 30 wt %, preferably 5 to 20 wt %, and most suitably the anionic surfactant concentration is about 10 wt %.

The choice of non-ionic surfactant is also not limited and any non-ionic surfactant suitable for 20 use in a laundry composition may be used. Examples of suitable non-ionic surfactants are primary and secondary alcohol ethoxylates, especially the  $C_8$  -  $C_{20}$  aliphatic alcohols 25 ethoxylated with an average of from 1 to 20 moles of ethylene oxide per mole of alcohol, and most particularly the  $C_{10}$  -  $C_{15}$  primary and secondary aliphatic alcohols ethoxylated with an average of from 1 to 10 moles of ethylene oxide per mole of alcohol. Non-ethoxylated non-ionic surfactants include alkyl polyglycosides, glycerol

monoethers, alkanol amides and polyhydroxyamides (glucamide).

Particularly preferred non-ionic surfactants are Coceth-6 (PEG ether of coconut alcohol);  
5 Coceth-10 (PEG ether of coconut alcohol); Laureth-6 (PEG ether of lauryl alcohol); Lauramide DEA, which is available under the trade name EMPILAN 26224 from Albright & Wilson; and lauryl polyglucoside, which is available under 10 the trade name PLANTEREN 1200CS/UP from Henkel.

The non-ionic surfactants are desirably present in amount of 0 to 20 wt %, preferably 0.5 to 10 wt %, and most suitably about 1 to 2 wt %.

15 Particularly preferred amphoteric surfactants are cocoamidopropylbetaine, such as that available under the trade name EMPIGEN from Albright & Wilson and amine oxides, such as lauramine oxide, which is available under the 20 trade name TEGAMINE OXIDE W from Goldsch.

The amphoteric surfactants are desirably present in amounts of 0.5 to 20 wt % and preferably 0.5 to 10 wt %.

25 In addition to the above specified ingredients and water, the compositions of the present invention can optionally contain relatively minor amounts of the usual types of non-surfactant auxiliary ingredients as are commonly employed in conventional laundry detergents, for example 30 inorganic salts such as sodium carbonate, sodium

5 sulphate or sodium silicate (where the composition is a powder); anti-redeposition agents such as cellulosic polymers; preservatives; optical brighteners; pearlescent agents; colourants; viscosifying agents such as sodium chloride and pH regulators such as citric acid. This list is not intended to be exhaustive.

10 Detergent compositions of the invention may be of any suitable form, for example powders or granules, liquids or gels. The manner in which the detergent compositions are prepared or formulated is not particularly critical and such may be prepared by methods well known to those skilled in the art.

15 The detergent compositions of the present invention are especially well suited and beneficial for the laundering under relatively mild washing conditions (e.g. mild or gentle machine agitation or hand washing and at low or cold wash water temperature) of fine fabric materials such as knitted fabrics of wool and silk, nylon and polyester. In addition to an excellent washing result, these fabrics do not become hard, but instead retain their natural 20 softness, not only with hand washing but also with machine washing.

25 In order that the invention may be more fully understood, it will now be described with reference to the following examples, in which all 30 percentages are on a weight basis.

Example 1

A fine fabric wash detergent composition was prepared from the following ingredients:

5	Component	wt%	Nature	Trade name
	$\alpha$ -olefine Sulphonate	5.2	Anionic surfactant	RHODACAL A 246 L (RP)
10	Sodium Lauryl Sulphate	8.3	Anionic surfactant	EMPICOL LX (A&W)
	Lauryl Polyglucoside	1.0	Non-ionic Surfactant	PLANTEREN 1200CS/UP (HENKEL)
15	Lauramide DEA	0.75	Non-ionic Surfactant	EMIPLAN 26224 (A&W)
	Cocoamidopropyl betaine	2.5	Amphoteric surfactant	EMPIGEN (A&W)
20	Amino-functional silicone emulsion	1.1	silicone	MAGNASOFT Em. 410 (Witco)
	Palmitadohexadenediol	0.9	Ceramide	CERAMIDES II (Quest)
25	Citric Acid	0.05	pH regulator	
	Preservative	0.05		
	Dye	0.01		
	Fragrance	0.20		
	Deionised Water	qsp 100		

Example 2

A fine fabric wash detergent composition was prepared from the following ingredients:

	Component	wt%	Nature	Trade name
5	Sodium Lauryl Ether Sulphate	3.5	Anionic surfactant	EMPICOL ESC3 (A&W)
10	Sodium Lauryl Sulphate	4.3	Anionic surfactant	EMPICOL LX (A&W)
15	Coceth-6	1.6	Non-ionic surfactant	REWOPAL LA 6 (Witco)
20	Lauramide DEA	0.5	Non-ionic surfactant	EMIPLAN 26224 (A&W)
25	Lauramine oxide	2.5	Amphoteric surfactant	TEGAMINE OXIDE W (Goldsch.)
30	Amino-functional silicone emulsion	0.6	silicone	MAGNASOFT Em. 410 (Witco)
	Bishydroxyethyl biscetyl malonamide	0.5	Ceramide	QUESTAMIDE H (Quest)
	Citric Acid	0.05	pH regulator	
	Sodium chloride	2.0		
	Preservative	0.05		
	Dye	0.01		

Fragrance	0.2		
Deionised Water	qsp 100		

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Example 3

A fine fabric wash detergent composition was prepared from the following ingredients:

	Component	wt%	Nature	Trade name
10	Disodium Lauryl sulphosuccinate	4.2	Anionic surfactant	REWOPOL SB F12 (Witco)
15	Sodium Lauryl Sulphate	6.6	Anionic surfactant	EMPICOL LX (A&W)
20	Coceth-10	1.4	Non-ionic surfactant	REWOPAL LA 10 (Witco)
25	Cocamidopropyl betaine	2.9	Amphoteric surfactant	EMPIGEN (A&W)
	Cyclohexylamino-functional silicone emulsion	1.5	silicone	FINISH CT110 (Wacker)
	Palmitadohexadenediol	1.0	Ceramide	CERAMIDES II (Quest)
	Palmitamido serinate de myristyl	0.5	Ceramide	CERAMIDE A2 (Seporga)
	Citric Acid	0.05	pH regulator	
	Preservative	0.05		

Dye	0.01		
Fragrance	0.2		
5 Deionised Water	qsp 100		

Example 4

10 A fine fabric wash detergent composition was prepared from the following ingredients:

	Component	wt%	Nature	Trade name
15	Sodium Alkyl Benzene sulphonate	8.2	Anionic surfactant	REWOPOL SB F12 (Witco)
20	Sodium Lauryl Ether Sulphate	8.6	Anionic surfactant	EMPICOL LX (A&W)
25	Lauryl Polyglucoside	2.6	Non-ionic Surfactant	PLANTEREN 1200CS/UP (HENKEL)
	Lauramide DEA	0.75	Non-ionic Surfactant	EMIPLAN 26224 (A&W)
	Lauramine oxide	2.3	Amphoteric surfactant	TEGAMINE OXIDE W (Goldsch.)
	Amino-functional silicone emulsion	4.5	silicone	DC 225 (Witco)

Bishydroxyethyl biscetyl Malonamide	2.25	Ceramide	QUESTAMIDE H (Quest)
Glycosphingolipids	2.5	Ceramide	CERAMIDE PG5 (Seporga)
Citric Acid	0.05	pH regulator	
Preservative	0.05		
Dye	0.01		
Fragrance	0.2		
Deionised Water	qsp 100		

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Example 5

A fine fabric wash detergent composition was prepared from the following ingredients:

Component	wt%	Nature	Trade name
Sodium Alkyl Benzene sulphonate	15.5	Anionic surfactant	REWOPOL SB F12 (Witco)
Coceth-6	5.0	Non-ionic surfactant	REWOPAL LA 6 (Witco)
Sodium Cocoate	3.0	Soap	NORFOX COCO POWDER (Norman)
Sodium silicoaluminate (Zeolite)	23.0	Builder	WESSALITH S (Degussa)

	Sodium silicate	3.0	Builder	
	Sodium carbonate	5.0	Builder	
5	Sodium bicarbonate	15.0	Builder	
	Sodium sulphate	15.0	Filler	
10	Cyclohexylamino-functional silicone emulsion	1.5	Silicone	FINISH CT110 (Wacker)
	Glycosphingolipids	2.5	Ceramide	CERAMIDE PG5 (Seporga)
	Sodium citrate	10.0		
15	Fragrance	0.2		
	Water	qsp 100		

20 In order to demonstrate the desired effects of  
the present invention, the following test was  
performed.

25 Wool fibres of diameter 0.1 - 0.14 mm were  
evaluated for elasticity using a Rheometrics RSA  
2 Solids analyser fitted with a monofilament  
geometry to give a sample length of 24 mm. The  
test used was a steady strain rate test using a  
constant strain rate of  $0.0001 \text{ s}^{-1}$  with the  
temperature controlled at  $20^\circ\text{C}$ . This allowed  
30 measurement of Youngs modulus for a strain

between 2 and 3% in the elastic region of the wool fibre which is equal to the elastic modules  $G^1$ . Values of  $G^1$  are given in the table below:

	<u>Elasticity</u>
5	Wool without treatment $9.66 \times 10^7$ Pa/%
	Wool washed 3 times with water only $3.23 \times 10^7$ Pa/%
	Wool washed 3 times with detergent formulation containing a ceramide $3.73 \times 10^7$ Pa/%
	Wool washed 3 times with detergent formulation containing a ceramide plus a silicone emulsion $6.79 \times 10^7$ Pa/%
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From the results it can be seen that a formulation containing a ceramide and a silicone emulsion significantly increased the elasticity of the wool fibre compared to washing in water alone or with a formulation containing ceramide alone.

Furthermore, further tests carried out on different fabrics showed a noticeable improvement of the softness of each fabric when the fabric was washed in a detergent formulation containing ceramide and silicone emulsion compared to washing in water alone or in a standard detergent formulation which did not contain a silicone derivative or a ceramide. Derived from cosmetics technology, it would appear that the ceramides penetrate into the fibres to restore both their strength and volume. In addition, the silicone appears to impart a softness to all types of textiles.

For example, the following test was performed to demonstrate the improved softness of fabrics washed in a detergent formulation in accordance with the present invention.

5       Four groups of wool or wool/acrylic fabrics were hand-washed in:

Formulation 1: the formulation in accordance with Example 3, as described previously;

10       Formulation 2: the formulation of Example 3 minus any ceramide or silicone emulsion;

Formulation 3: the formulation in accordance with Example 5, as described previously; and

15       Formulation 4: the formulation of Example 5 minus any ceramide or silicone emulsion.

20       The fabrics were hand-washed with 35 ml of the detergent diluted in 5 litres of water (middle hardness water) at 30°C and then rinsed twice in 5 litres of cold water.

25       After 3 washes, panellists were asked to compare the softness of the washed fabrics. The figures given in the table below indicate the perceived softness of the fabrics as compared to the softness of the fabrics prior to washing.

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Fabric	Formulation 1 vs Formulation 2		Formulation 3 vs Formulation 4	
	Formulation 1	Formulation 2	Formulation 3	Formulation 4
Wool	90%	10%	75%	25%
Wool/Acrylic	75%	25%	80%	20%

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CLAIMS

1. A laundry detergent composition for washing  
delicate fabrics comprising:

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a) one or more anionic, non-ionic or  
amphoteric surfactants or a mixture of  
two or more thereof;

b) a natural and/or synthetic ceramide;

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c) a silicone; and

d) optionally other detergent ingredients.

2. A detergent composition according to Claim 1,  
15 wherein the silicone is an amino-functional  
silicone.

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3. A detergent composition according to Claim 2,  
wherein the silicone is a microemulsion of a  
polydimethylsiloxane.

4. A detergent composition according to claim 1,  
comprising:

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a) 2 to 60 wt % of one or more anionic, non-ionic  
or amphoteric surfactants or a mixture of two  
or more thereof;

b) from 0.001 to 5 wt % of one or more ceramides;

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c) from 0.05 to 5 wt % of a polydimethyl-  
siloxane; and

d) optionally other detergent ingredients to 100 wt %.

5. A detergent composition according to any of claims 1 to 4, wherein the ceramide is selected from Bis (N-hydroxyethyl cetyl) Malonamide; Palmitadohexadecanediol; Palmitado-serinate de myristyl and glycosphingolipids.

10. 6. A process for laundering fabric materials comprising the steps of immersing the material, with at least mild agitation, in a detergent composition comprising:

15. a) one or more anionic, nonionic or amphoteric surfactants or a mixture of two or more thereof;

b) a natural and/or synthetic ceramide;

20. c) a silicone; and

d) optionally other detergent ingredients.

25. 7. A process for laundering fabric materials comprising the steps of immersing the material, with at least mild agitation, in a detergent composition comprising:

a) 2 to 60 wt % of one or more anionic, non-ionic or amphoteric surfactants or a mixture of two or more thereof.

- b) from 0.001 to 5 % of one or more ceramides;
- c) from 0.05 to 5 wt % of an aminopolydimethyl siloxane; and
- 5 d) optionally other detergent ingredients to 100 wt %.

8. A process according to Claim 6 or 7, wherein the fabric material laundered thereby is a

10 silk, nylon, polyester or wool fabric material.

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Application No: GB 9821813.4  
Claims searched: 1-8

Examiner: Jason Bellia  
Date of search: 11 January 1999

**Patents Act 1977**  
**Search Report under Section 17**

**Databases searched:**

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.Q):

Int Cl (Ed.6):

Other: ONLINE: CAPLUS, EPODOC, WPI, PAJ

**Documents considered to be relevant:**

Category	Identity of document and relevant passage	Relevant to claims
A	WO 97/12587 A1 (L'OREAL) See page 11 line 21 - page 12 line 2 & Examples 3 & 4	-
A	WO 94/10131 A1 (UNILEVER) See page 10 line 1 - page 12 line 21, page 14 line 29 - page 17 line 30, page 18 line 1 - page 19 line 31	-

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.